

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #5

19-22 June 2001

Lexington, MA

Results on the utilisation of the frequencies 978 and 979 MHz in Europe

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SUMMARY

This paper discusses the current and planned usage of the DME frequencies 978 and 979 MHz in Europe.

1. Introduction

UAT is one of the candidate datalinks, which are considered in relation to ADS-B services. UAT has not been allocated as yet a dedicated frequency. The current discussions in the RTCA UAT MOPS group focus on using a single 1 MHz channel (with no guard channels) in the lower part of the UHF Aeronautical Radionavigation (ARN) band. The frequencies 978 and 979 MHz have been proposed for consideration by US, as these two frequencies are used for testing purposes and there seems to be no operational allocations in USA (RTCA SC186/WG5/WP-2-09).

The two proposed frequencies correspond to the frequencies used for the replies of the DME ground equipment to the aircraft interrogations in the channels 17X and 18X. The coupling correspondence of these DME channels with VHF as well as MLS channels is described by ICAO (Annex 10, Volume I, Chapter 3, Table A) in the following table.

DME channel number	DME interrogation frequency (a/c)	DME reply frequency (ground)	VHF paired frequency	MLS paired channel number
17X	1041 MHz	978 MHz	108.00 MHz	-
18X	1042 MHz	979 MHz	108.10 MHz	500

Table 1: DME/VHF/MLS channel pairing

The objective of this paper is to present the results of an investigation on the usage of these two frequencies in Europe.

2. Usage in Europe of the DME channels 17X and 18X

In the EUR region the information on the frequency assignments for the different navigation aids is stored in the COM3 tables, which are maintained by the ICAO Paris office. These tables register the existing and planned usage of all aeronautical frequency assignments. However, since the maintenance of this live database is not optimum, the information contained in these tables is not always accurate. Therefore this investigation can only be indicative of the DME channel assignment status. For the purposes of this investigation a copy of the COM3 tables dating April 2001 was used and this was checked with a version of the COM3 database maintained by a European State (France).

The analysis of the database showed the following results as detailed in Table 2:

Service type	17X (978 MHz)	18X (979 MHz)
DME	1	1
TACAN	4	3
VOR/DME	1	0
ILS/DME	0	11
MLS/DME	0	35
Total assignments	6	50

Table 2: DME channel assignments in COM3 tables in the 978-982MHz band

In terms of geographical coverage the above entries are spread throughout the EUR region and are registered by more than 20 countries.

Figures 1 and 2 illustrate the assignments for the 17X and 18X channels across the EUR region.

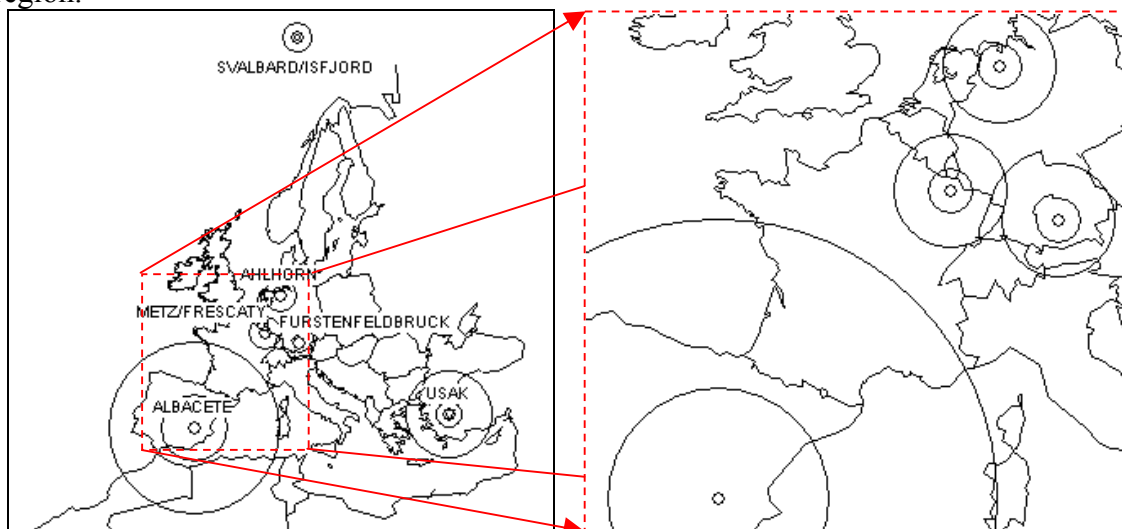


Figure 1: Usage of DME channel 17X (with a zoom-in in the centre area)

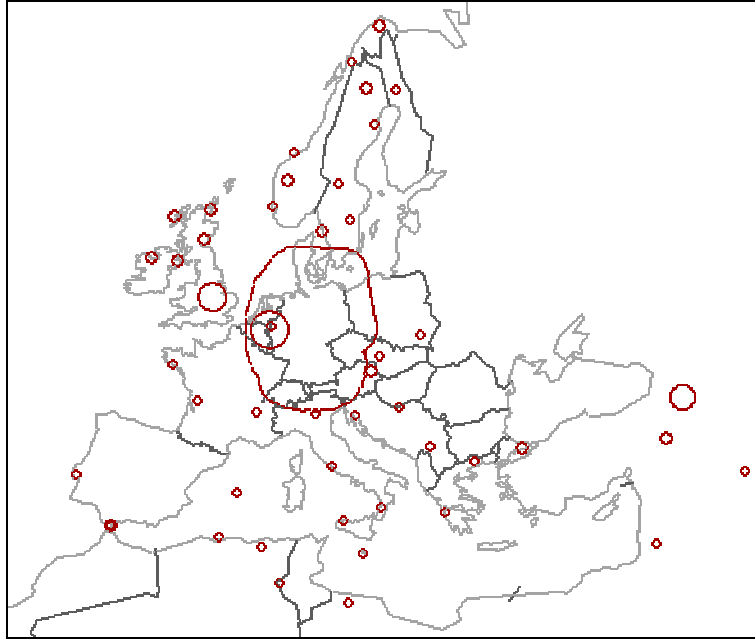


Figure 2: Usage of DME channel 18X

With the exception of the channels whose usage is restricted due to the SSR (60X to 69X), the channel 17X is among the DME channels with the least utilisation according to the COM3 tables. In particular it is the channel with the least paired VHF frequency assignments (1 VOR/DME).

2.1 Investigation of the reallocation of assignments in channel 17X

In order to evaluate the issues associated with a potential reallocation of the assignments in 17X, it was decided to examine the feasibility of the reallocation for all the assignments. This analysis was done using the Eurocontrol frequency planning software tool MANIF.

It is important to highlight that a full reallocation exercise has many steps. Firstly the existing databases are searched to find an alternative frequency. In a second step this frequency has to be manually checked for implementation feasibility for reasons of possible implications to other systems in the same or neighbouring sites (e.g. cosite issues in VHF). Lastly and most importantly the reallocation has to be co-ordinated with all the parties involved (different national frequency assignment authorities). Experience (in the Frequency Management Group/Block Planning meetings) shows that the success rate of this exercise is in the order of 50% if one or more shifts are required. Evidently, the greater the number of shift required the more difficult the success of reallocation. In the investigation in this paper only the first step of the full reallocation exercise (database search) was simulated.

Furthermore, from the proposed solutions, the ones that correspond to channels with restricted usage (60X to 69X and 60Y to 79Y) were ignored.

	Direct	1 shift	2 shifts
AHLHORN	1	9	5
FURSTENFELDBRUCK	1	11	8
ALBACETE	32	Not analysed	Not analysed
METZ/FRESCATY	0	3	1
SVALBARD/ISFJORD	151	Not analysed	Not analysed
USAK	22	Not analysed	Not analysed

Table 3: Reassignment options of current 17X assignments

It has to be noted that the alternative solutions were in many cases the same identified for the other cases. Naturally, this means that if all systems operating in these frequencies were to be reassigned, the list of options would be decreasing with every successful reassignment. This is not reflected in the above table. For three assignments, the solutions with shift(s) were not investigated. This was only because there were many options that did not involve a shift and therefore it is expected that a direct solution should be feasible.

In addition, traffic increase forecasts indicate that there may be the need for additional DMEs to be deployed (both in airport and enroute) to support the foreseen traffic levels. The deployment of new DMEs will be an additional factor for consideration in reassigning some existing DMEs.

3. Conclusions

This paper examined the European usage of the DME channels that are using the 978 and 979 MHz frequencies. The search of the European navigation databases has identified a number of assignments in the 978 and 979 MHz frequencies.

The investigation of the assignments in 978 MHz showed that for the assignments in the non-core European area, it is possible to find a number of alternative frequency assignments. However, in the core European area, the options for reallocation are limited and may require frequency reallocation of other navigation assignments.

This analysis is based on the current deployment of the navigation aids infrastructure in Europe. The plans on the future DME usage are very important to fully analyse the feasibility of reassigning any existing assignments.